

How does a brain decide?

A 20-minute activity with a real fruit fly brain · ages 11–16 · free, no sign-up

In 2026 a team at HHMI Janelia, the University of Cambridge and Google published the complete wiring map of a male fruit fly's central nervous system: every neuron of its brain and nerve cord, more than 166,000 of them, and how each one connects to the others. A map like this is called a **connectome**.

The game **guess the fly** runs a model built from that map (165,122 fully traced neurons). We send a signal into the neurons that sense something (a smell, a taste, a shadow), the activity spreads through the real wiring, and we watch which "decision" neurons fire. Nobody wrote a rule like "*if dung, back away*". The answer comes out of the wiring.



What you need

One screen per group (a phone works), sound optional. Print page 2 for each student. Open

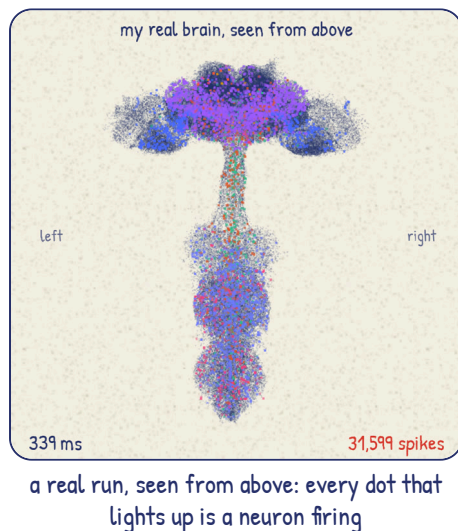
play.drosophila.io/class: it plays the same eight situations as the worksheet, in the same order.

Steps

1. **Warm-up (3 min)**. Ask: when you touch something hot, do you decide to pull your hand back, or does it just happen?
2. **Predict (5 min)**. Alone, students fill in "my guess" on the worksheet. No phones yet.
3. **Test (8 min)**. Play the class link together. For each situation, students write what the real brain did.
4. **Talk (4 min)**. Use the questions on the right.

Questions to discuss

- Which answers surprised you? Why might a fly lean in to *old meat*?
- Movement past the left eye makes the fly turn left. Nobody programmed that. Where did it come from?
- Which of your own reactions happen before you think?
- Read the box below. Does it change how much you trust the results?



Answer key

#	the fly senses	the real brain
1	the smell of honey	leans in
2	a dark shape, growing fast	jumps away
3	the smell of dung	backs away
4	movement past its left eye	turns left
5	the smell of old meat	leans in
6	a female, right there	sings
7	a breeze over its antennae	backs away
8	a touch on its antennae	cleans itself

Be honest with the class: what is real, and what is not. The wiring is the real, traced map. The model has limits: it sees no pictures (light and motion enter a few layers inside the eye), a few dozen cells in the smell centre are held quiet so one smell does not set off the whole brain, and it has no body, so legs, wings and mouth are neurons that fire. The very last step, turning the firing motor neurons into a word like "backs away", was written by hand.

guess the fly

name _____

date _____

A real fruit fly brain, wired from the map of all its neurons, is going to sense eight things. **First guess what it does.**
Then watch the real brain decide at play.drosophila.io/class

Choose from: leans in · tongue out · backs away · jumps away · stays calm · turns left · turns right · sings · cleans itself

#	the fly senses...	my guess	what the real brain did	surprised?
1	the smell of honey			yes · no
2	a dark shape, growing fast			yes · no
3	the smell of dung			yes · no
4	movement past its left eye			yes · no
5	the smell of old meat			yes · no
6	a female, right there			yes · no
7	a breeze over its antennae			yes · no
8	a touch on its antennae			yes · no

I guessed / 8 right.

Think about it

1. The answer that surprised me most, and why I think the fly does it:

2. Nobody wrote a rule telling this brain what to do. So where does the answer come from?

3. One reaction of my own that happens before I think about it:

Every answer in the game is a real, recorded run of a brain model built from the Male CNS connectome (Janelia, Cambridge, Google).